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PERFORMANCE OF SEVERAL FORAGE SPECIES ON NEWLY BURNED LODGEPOLE PINE SITES

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Following fire, extensive stands of lodgepole pine[1/] have become established on burned-over mountainous lands in Northeast Washington. Growth is slow in these stagnated stands, frequently referred to as "doghair" lodgepole or thickets, and the grazing capacity of the land is reduced many fold. Seventeen years after burning on one area Lommasson (1946) found that the carrying capacity of sheep range had been reduced by approximately three-fourths because of down timber and the establishment of dense stands of shrubs and lodgepole pine.

Management of these lands poses a difficult problem. Some land managers and livestock operators have considered the use of prescribed broadcast burning of selected areas to improve grazing conditions and to reduce or remove the hazard of accidental fires. Others have questioned whether prescribed burning would accomplish the desired results. They have pointed out the possible serious consequences of burning on watershed management. How can these areas be treated to improve tree growth, provide additional livestock range, and still protect the watershed? At present, land managers do not have a clear-cut solution.

A start was made on the problem in 1949 by the experiment station working in cooperation with the Colville National Forest. Several desirable forage species were tested at two locations to determine their adaptability to conditions existing on newly burned lodgepole pine sites in Northeast Washington.

1/ A list of common and botanical names of plants mentioned appears on page 6.

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Description of Study Area

The study area consisted of two blocks, each about 100 feet square, one facing southwesterly and the other with a northeast exposure. Located on the Kettle Falls District of the Colville National Forest at an elevation of approximately 5000 feet, the area selected was a portion of the 140,000-acre 1929 Dollar Mountain burn. The shallow, well drained soil was composed of fine weathered material of granitic origin interspersed with small to boulder-size fragments. Weathering of the parent material on the northeast slope was more advanced and the amount of humic material greater than that on the area exposed to the southwest.

Vegetation on the study area before its removal in 1949 to prepare the sites for seeding to forage species consisted mainly of lodgepole pine saplings (see figure 1) with occasional clumps of willow and alder present on the northeast-facing slope. Density of the pine stands as determined by stem counts on five milacre plots at each study site was 21,600 and 45,400 stems per acre for the northeast and southwest exposures, respectively. Before the 1929 burn, vegetation was composed mainly of western larch, Douglas-fir, and lodgepole pine, all growing in sufficiently open stands to permit livestock grazing. The climax type for this area probably is Engelmann spruce-Alpine fir.

The Study

The lodgepole pine reproduction and snags on the study areas were cut and the resulting debris burned in September 1949. Eighteen forage species were individually broadcast-seeded in the ashes on plots measuring 16 feet by 31 feet in each of the two study blocks. No attempt was made to cover the seed. The following species were tested: big bluegrass, Manchar smooth bromegrass, tall and sheep fescues, green needlegrass, tall oatgrass, common orchardgrass, redtop, Russian wildrye, timothy, four wheatgrasses--beardless bluebunch, standard crested, intermediate, and pubescent, Ladak alfalfa, small burnet, and alsike and yellow sweet clovers. Plant vigor and distribution of the resulting stands were observed in the early summer and fall of each season after seeding.

Results

Satisfactory stands of big bluegrass, alsike clover, sheep fescue (see figure 1), common orchardgrass, tall oatgrass, redtop, and timothy became established on the southwesterly exposed site. However, after four growing seasons, bluegrass, sheep fescue, redtop, and timothy stands were considered adequate in vigor and density (table 1). A good deal of the loss in vigor and stand density was due to the heavy concentration of deer and rodents on the small plots. Maintenance of these species seems doubtful; within the last year stand density has declined 57, 46, 36, and 62 percent for big bluegrass, sheep fescue, redtop, and timothy, respectively.

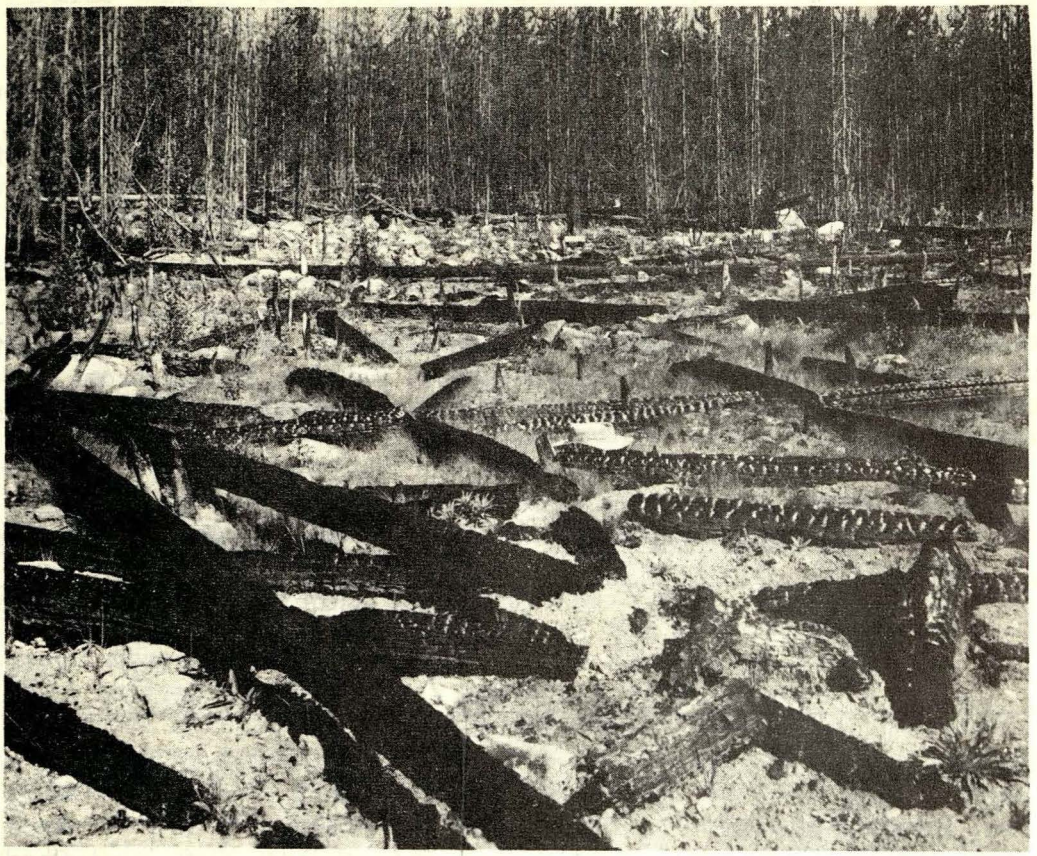

Figure 1. A portion of the southwest-facing study area showing typical stand of lodgepole pine saplings, condition of the site after reproduction was cut and burned, and sheep fescue stand after two growing seasons.

The severe site and poorly developed soil at this location contributed materially to the unsatisfactory species performance. Also because of the southerly exposure, these slopes are preferred by game animals over those exposed to the north. For this reason and also because of increased availability of feed, several of the reseeded species on the study area were used heavily by deer and rabbits soon after the seedlings emerged. Alsike clover, yellow sweet clover, Manchar smooth bromegrass, orchardgrass, redtop, and tall fescue, in that order of preference, were used by wildlife at this location. This grazing use undoubtedly influenced the performance of the reseeded species.

Soil and moisture conditions were more favorable on the northeasterly exposed site and here the seeded species were more successful (table 1). Excellent stands were produced by sheep fescue, tall oatgrass, redtop, and pubescent wheatgrass. Big bluegrass, Manchar smooth brome, orchardgrass, timothy, and beardless bluebunch wheatgrass also performed satisfactorily.

Table 1. Stand density and vigor of tested species on southwest and northeast-exposed study areas four years after seeding

Species	Southwest exposure		Northeast exposure	
	Plants per sq. ft.	Vigor	Plants per sq. ft.	Vigor
Alfalfa, Ladak	Failed		0.2	Very poor
Bluegrass, big	6.4	Good	7.2	Good
Brome, Manchar smooth	4.4	Fair	8.2	Good
Burnet, small	Failed		0.2	Good
Clover, alsike	4.6	Poor	3.2	Poor
Clover, yellow sweet	Failed		Failed	
Fescue, common sheep	17.2	Good	15.4	Excellent
Fescue, tall	3.0	Fair	4.4	Good
Needlegrass, green	1.6	Fair	1.2	Good
Oatgrass, tall	1.8	Good	5.0	Excellent
Orchardgrass, common	4.2	Fair	8.4	Good
Redtop	16.0	Good	9.6	Excellent
Timothy	12.4	Good	21.8	Good
Wheatgrass, beardless bluebunch	0.8	Poor	5.4	Good
Wheatgrass, intermediate	0.4	Very poor	3.4	Good
Wheatgrass, pubescent	1.2	Fair	5.2	Excellent
Wheatgrass, standard crested	1.6	Poor	1.6	Good
Wildrye, Russian	Failed		2.0	Good

Excepting yellow sweet clover which failed, stands of the remaining species were poor. Alsike clover was grazed heavily at this site also and small burnet received light use.

Despite the establishment of successful stands of most of the tested forage species, native shrubs have increased decidedly on the northeasterly block in the past four years. This increase is due to the establishment of new plants from seed as well as regrowth of plants that were not completely destroyed by burning. Favorable growing conditions at this site and removal of the lodgepole pine reproduction undoubtedly favored the increase in shrub density. It seems highly probable that shrubs will dominate this area in the near future.

Summary and Conclusions

Adaptation tests of 18 forage species broadcast seeded in the ashes of freshly burned stagnated lodgepole pine stands resulting from the 1929 Dollar Mountain burn indicate that several species appear to be temporarily suited to conditions of the test sites. Four years after seeding, big bluegrass, sheep fescue, redtop, and timothy still existed in satisfactory stands on the southwest exposed site. Successful stands were initially obtained with alsike clover, orchardgrass, and tall oatgrass, but droughty conditions of the site resulted in a reduction of stand density. However, stand density of all species has continued to decline since establishment and maintenance of any reseeded species on this site seems questionable. Under more favorable soil and moisture conditions on a northeast-facing site, sheep fescue, tall oatgrass, redtop, and pubescent wheatgrass produced excellent stands. In addition, big bluegrass, Manchar smooth brome, orchardgrass, timothy, and beardless bluebunch wheatgrass performed satisfactorily.

Alsike clover was heavily used by deer and rabbits at both locations. On the southwest-facing site, in descending order of preference, yellow sweet clover, Manchar smooth bromegrass, orchardgrass, redtop, and tall fescue were also used by game animals. On the other hand, at the area with the northeast exposure, small burnet was the only other species grazed and that lightly. The apparent species preference shown by wildlife at these locations may be of importance in selecting species to reseed such areas.

On the more favorable northeast-facing site, shrub species have increased even where successful reseeded stands were obtained on the plots. It is believed that shrubs will soon dominate the site. On the southwest-facing area where growing conditions are less favorable, shrub encroachment is of no consequence.

Lodgepole pine reproduction has not become reestablished on either of the study areas, probably because of a pine seed shortage rather than because of the competitive influence of the reseeded stands.

In the event of accidental burns in dense stands of lodgepole pine reproduction, reseeding to suitable species would provide an immediate protective vegetation cover for the watershed. Species performance in a large reseeding effort of this nature would probably be more satisfactory than that observed in this small-scale test. However, this test provides guides to species selection for the two broad situations studied.

Common and Botanical Names

Alder	Alnus spp.
Alfalfa, Ladak	Medicago sativa var. media, Ladak
Bluegrass, big	Poa ampla
Brome, smooth	Bromus inermis, Manchar
Burnet, small	Sanguisorba minor
Clover, alsike	Trifolium hybridum
Clover, yellow sweet	Melilotus officinalis
Fescue, sheep	Festuca ovina
Fescue, tall	Festuca elatior arundinacea
Fir, Douglas	Pseudotsuga menziesii var. glauca
Fir, Alpine	Abies lasiocarpa
Larch, western	Larix occidentalis
Needlegrass, green	Stipa viridula
Oatgrass, tall	Arrhenatherum elatius var. Tualatin
Orchardgrass	Dactylis glomerata
Pine, lodgepole	Pinus contorta latifolia
Redtop	Agrostis alba
Spruce, Engelmann	Picea engelmanni
Timothy	Phleum pratense
Wheatgrass, beardless bluebunch	Agropyron inerme
Wheatgrass, crested	Agropyron cristatum
Wheatgrass, intermediate	Agropyron intermedium
Wheatgrass, pubescent	Agropyron trichophorum
Wildrye, Russian	Elymus junceus
Willow	Salix spp.

Literature Cited

Lommasson, T.
1946. The trend of grazing capacity on burned timber range, Colville National Forest, Washington 1930-1946. U. S. Forest Service, Developments in Range Management No. 5, 3 pp.